

THE ISOLATION OF LYCORINE

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The alkaloid lycorine has been isolated previously from the plants Ungernia severtzovii and U. tri-sphaera [1, 2]. At the present time, it is recommended by the Pharmaceutical Committee of the Ministry of Public Health of the USSR for production as an expectorant, and also as an agent for treating acute and chronic bronchitides and bronchial asthma [3]. We have investigated the possibility of isolating the alkaloid lycorine from the epigeal parts of Ungernia severtzovii by the ion-exchange method.

Various organic solvents and weak aqueous solutions of acids were tested for the extraction of lycorine from the plant material. Satisfactory results were obtained by using chloroform and 1% hydrochloric acid. We subsequently used 1% hydrochloric acid as the most acceptable and economically suitable.

The hydrochloric acid extract of the alkaloids was sorbed by the cation-exchange resins KU-1, KU-2, SDV-ZT, and SBS, of which KU-1 was found to be best. The sorbed alkaloids were eluted from the KU-1 resin by ammoniacal solutions of alcohols (methanol and ethanol). The results of the investigations performed permitted the development of an ion-exchange method for isolating lycorine from Ungernia severtzovii, as follows: 160 kg of the comminuted air-dry leaves of this plant was loaded into a battery of four extractors and extracted at the rate of 15-18 liters/h with 1% hydrochloric acid. After 200 liters of extract had been obtained, the first extractor was taken out of the circuit and an extractor with a fresh portion of raw material was connected to the end of the battery; this cycle was continued indefinitely. The amount of raw material was extracted in this way was 200 kg.

The acid extract of the alkaloids was passed through a battery of five absorbers, each of which contained 4-4.5 kg of KU-1 cation-exchange resin in the H form. Then the adsorbents were washed with water, and the alkaloids were eluted with 85-90% ethanol containing 2% of ammonia. The ethanolic eluate was evaporated in vacuum, and the residue was treated with small portions of chloroform four or five times. The chloroform extract was concentrated, and the residue, consisting of the combined alkaloids, was carefully dried in vacuum. Yield 1300 g or 0.65% of the weight of the raw material.

To isolate the lycorine, the combined alkaloids were dissolved in 10% sulfuric acid, and the acid solution was made alkaline with ammonia, giving a precipitate of lycorine. This was filtered off with suction and washed with acetone. The action of hydrochloric acid on the free lycorine gave lycorine hydrochloride, which was recrystallized from water. The yield of lycorine hydrochloride satisfying the requirements of MRTU [Interrepublican Technical Specification] 42 No. 3909-70 was 400 g, i.e., 0.2% of the weight of the raw material.

The amount of lycorine in the leaves of Ungernia severtzovii varies from 0.04 to 0.45% according to its growth site and the vegetation period.

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